

CARNEGIE MELLON UNIVERSITY

BME 2023 SPRING SEMINAR SERIES

“Listening to the Sound of Light to Guide Surgeries”



PRESENTED BY

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SCHEDULE

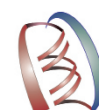
Hall of Arts (HOA) 160

Thursday,

January 19, 2023

(11:00AM-12:00PM)

Photoacoustic imaging offers “x-ray vision” to see beyond tool tips and underneath tissue during surgical procedures, yet no ionizing x-rays are required. Instead, optical fibers and acoustic receivers enable photoacoustic sensing of major structures – like blood vessels and nerves – that are otherwise hidden from view. The entire process is initiated by delivering laser pulses through optical fibers to illuminate regions of interest, causing an acoustic response that is detectable with ultrasound transducers. Beamforming is then implemented to create a photoacoustic image. In this talk, I will highlight novel light delivery systems, new spatial coherence beamforming theory, deep learning alternatives to beamforming, and robotic integration methods, each pioneered by the Photoacoustic & Ultrasonic Systems Engineering (PULSE) Lab to enable an exciting new frontier of photoacoustic-guided surgery. This new paradigm has the potential to eliminate the occurrence of major complications (e.g., excessive bleeding, paralysis, accidental patient death) during a wide range of delicate surgeries and procedures, including neurosurgery, cardiac catheter-based interventions, liver surgery, spinal fusion surgery, hysterectomies, biopsies, and teleoperative robotic surgeries.



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